Ontario

ORDER NO. 90-196
AUGUST 1990
91-00856/
AGDEX 537
Factsheet

COVER CROPS IN CONSERVATION FARMING

Keith Reid, Soil and Water Management Branch, Walkerton

The practice of growing cover crops is regaining popularity in Ontario. Many farmers are recognizing the benefits of cover crops, and are putting them to work in their farming system.

WHAT ARE THEY?

A working definition of a cover crop is any crop grown primarily to provide ground cover or to improve soil properties, rather than provide a harvestable yield. It is normally grown in the time period between regular crops, although it may be seeded into the preceding crop. Nearly any crop can be used as a cover crop, but some are more useful than others.

ADVANTAGES

The prime advantage of growing a cover crop is to keep the ground covered, as bare soil is an invitation to erosion by wind and water.

Another benefit is the cover crops' effect on soil structure and tilth. The improvement in the stability of soil aggregates and water-holding capacity creates a better medium for crop growth. Fibrous rooted cover crops, as in the grass family, will have a more immediate effect on surface soil structure, while crops with a deep tap root can help alleviate sub-surface compaction.

Cover crops also play an important role in nutrient management. Legumes, such as red clover or Austrian winter peas can provide a substantial amount of nitrogen to succeeding crops. As well, cover crops use water-soluble nutrients for their own growth, which prevents nutrient loss through leaching. These nutrients are released as the cover crop decomposes and are available to the crop that follows.

Weed control may also be improved through the use of cover crops. The cover crop competes for light, water and nutrients with annual or winter annual weeds. This reduces the weeds' vigour and their ability to set seed. Some studies

Figure 1 Bare soil is susceptible to erosion by wind and water.

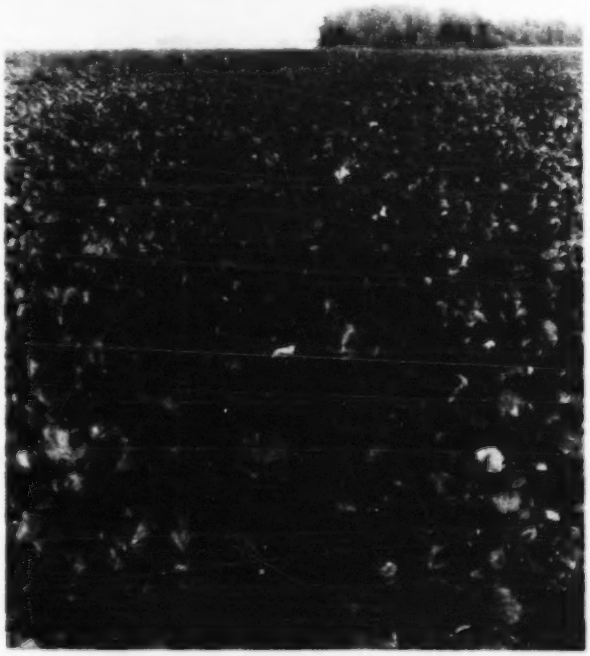

Figure 2 An actively growing cover crop, such as oilseed radish, effectively stops soil erosion. Oilseed radish is a new crop which is being assessed for usefulness under Ontario conditions.

have suggested that rye also secretes substances which suppress weed growth.[1]

Some cover crops can remove water from the soil through transpiration, provided that there is enough growth in the spring. While this can be a drawback in a dry spring, it is an advantage in years when excess soil moisture delays tillage and planting. Other cover crops which die over winter act to retain moisture through a mulch effect.

Properly managed cover crops lend themselves ideally to a no-till program because of their weed suppression and moisture management benefits.

A minor use for cover crops is as emergency pasture or forage for livestock. Any improvement in soil structure will be lost, however, if the field is pastured when it is too wet.

CONSIDERATIONS IN COVER CROP SELECTION

1. The crop should grow quickly under relatively cool conditions, as most cover crops grow in the fall.
2. It should be easily controlled by herbicides or tillage, or, if desired, it should be susceptible to winterkill. An improperly managed cover crop could become a weed in a succeeding crop.
3. It should provide a break in the disease or pest cycle which could affect the succeeding crop. This is generally accomplished when the cover crop is a different family than the crop to follow (eg. corn following clover).
4. Consider the crop sequence and the cover crop's effect on the following crop to reduce the potential for toxic effects from the decomposing residue of the cover crop.
5. Seed should be relatively inexpensive, and the cover crop should be easy to establish.
6. The cover crop chosen must fit into your cropping system.

COVER CROP MANAGEMENT

Establishing a cover crop is not significantly different from growing any other crop, and can be easily accomplished using regular tillage and planting equipment. Cover crops can be roughly divided into those which are interseeded into a growing crop, and those which are planted after harvest. Many interseeded cover crops are broadcast with no tillage; this works quite well with small seeds and early planting when the ground is moist. Larger-seeded cover crops and later plantings generally require some form of incorporation to ensure establishment.

For cover crops which are planted following another crop, a light discing before planting is usually the only tillage required. Alternatively the seeds could be broadcast directly into the stubble and disced in. A no-till drill is also effective, and reduces the number of passes over the field. Care must be taken at this time to avoid drying the soil through excess tillage, as moisture is often limiting. Planting must be early enough to allow the crop to produce adequate cover in the fall. This usually means planting immediately post-harvest.

Seeding rates vary widely for cover crops, although the rates given in OMAF Publication 296, *Field Crop Recommendations* are a good starting point. Generally, in early planting the seeding rate is reduced, as each plant is able to produce more leaf and root mass. For late planting, or if the erosion potential is severe, the seeding rate should be increased.

Extra fertilizer is usually not required for cover crop growth. Cover crops are generally efficient at absorbing nutrients left over from the preceding crop, or added as manure.

For management purposes, cover crops can be divided into three main groups:

1. **Legumes** These are generally best grown before a cereal crop or corn, which can utilize the nitrogen fixed by these plants. The forage legumes tend to grow slowly until they are well established, so these work best when interseeded into a cereal (either broadcast into winter cereals, or seeded with spring grain). Legumes generally do best in neutral to slightly alkaline soils, and will require inoculation with proper bacteria for maximum growth and nitrogen fixation. These crops can be controlled by tillage or hormone-type herbicides.
2. **Non-Legume Broadleaf Crops** These fit in well before a cereal crop or some legume crops. They are generally fast-growing, but some species are killed by frost. Crops of this type which do not winterkill can be controlled by tillage or hormone-type herbicides.
3. **Cereals** These fit in best before a broadleaf crop, although they are also used before corn. Cereal cover crops establish and grow quite quickly, but they must be planted early enough to establish good top growth in the fall. These crops can be killed by herbicides such as paraquat or glyphosate, or by tillage. Spring cereals, like oats, are often preferred because they die naturally over winter. These crops are generally planted following a regular crop, but some farmers are experimenting with interseeding them into a row crop.

Specific information about some of the commonly used cover crops in Ontario is found in Table 1.

Cover crops are a valuable part of a soil management package. Inquire at your local OMAF office for specific recommendations for your area.

[1] *Voutsinos, Marie-Therese. 1989 M.Sc. Thesis, Department of Crop Science, University of Guelph.*

Table 1 Characteristics of Some Common Cover Crops in Ontario

	Planting Options	Predominant Root Type	Winter Survival	Seeding Rate (kg/ha)	Comments
Legume					
Red Clover	I	C	Y	8-11	Double-cut is usually favoured over single-cut
Sweet Clover	I	C	Y	10	Biennial, makes most growth in 2nd year
Hairy Vetch	I	F	Y	15-20	Must be drilled or harrowed in; Slow growing until established
Field Peas	P	F	N	150	Will stand some frost, establishes fairly quickly
Austrian Winter Peas	P	F	Y	60	Poor winter survival in many areas; Use only in areas with over 2800 C.H.U.
Non-Legume Broadleaf					
Buckwheat	P	F	N	50	Fast growing, very sensitive to frost, shallow rooted
Oil Radish	P	T	N	9-12	Large tap root, responsive to nitrogen from fertilizer or manure
Canola					
- Winter	P	C	Y	4-5	Must be controlled in spring
- Spring	P	C	N	4-5	Winterkills easily, some varieties tolerate atrazine residues
Cereals					
Winter Rye	P,I	F	Y	110+	Vigorous, requires timely control
Spring Barley	P,I	F	N	90+	Some varieties do not completely winterkill
Oats	P,I	F	N	60+	Good fall growth, no winter survival

I - Inter-seeded P - Post-Harvest T - Large Tap Root F - Fibrous Root System
C - Combined Fibrous and Tap Root Y - Yes N - No

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ISSN 0225-7882